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Lim et al.

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- (54) **DISK PRODUCTION CASING AND DRIVE FOR RECEIVING THE SAME**
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Related U.S. Application Data

- (60) Division of application No. 10/337,999, filed on Jan. 8, 2003, now Pat. No. 6,757,240, which is a continuation of application No. 09/347,388, filed on Jul. 6, 1999, now Pat. No. 6,529,471.

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G11B 23/03 (2006.01)
- (52) **U.S. Cl.** **720/733**
- (58) **Field of Classification Search** **720/733,**
720/732, 728, 725
See application file for complete search history.

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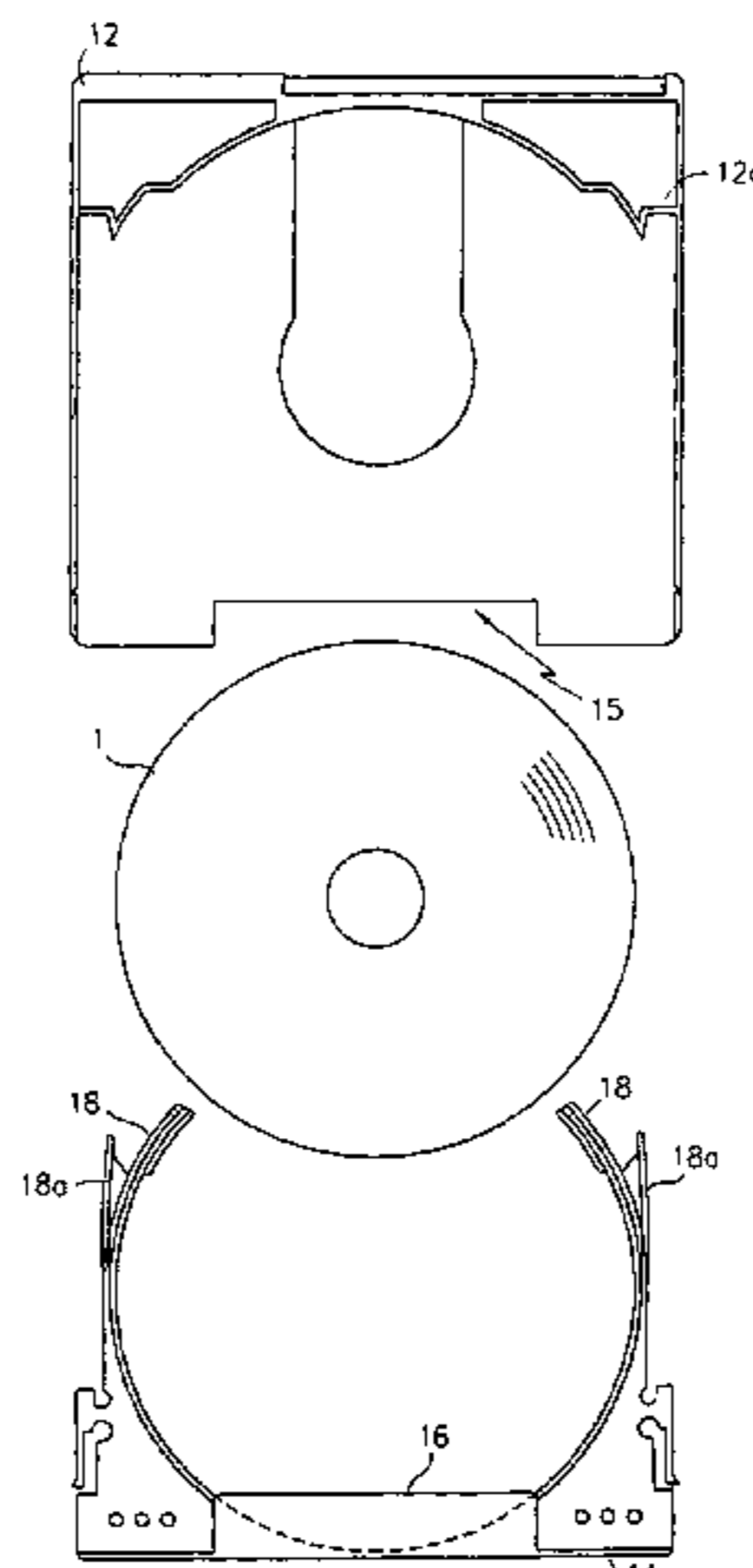
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(57) **ABSTRACT**

The disc protection casing includes a disc protection casing body having a disc receiving space therein. A disc holder, insertable into the interior of the disc protection casing body, has an elastic member formed at one end of the same for supporting a disc. When the disc holder is inserted into the casing body, a shoulder on the elastic member contacts a guide member in the casing body and the elastic member releases a disc supported thereby.

19 Claims, 8 Drawing Sheets



US 7,055,164 B2

Page 2

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FIG. 1
BACKGROUND ART

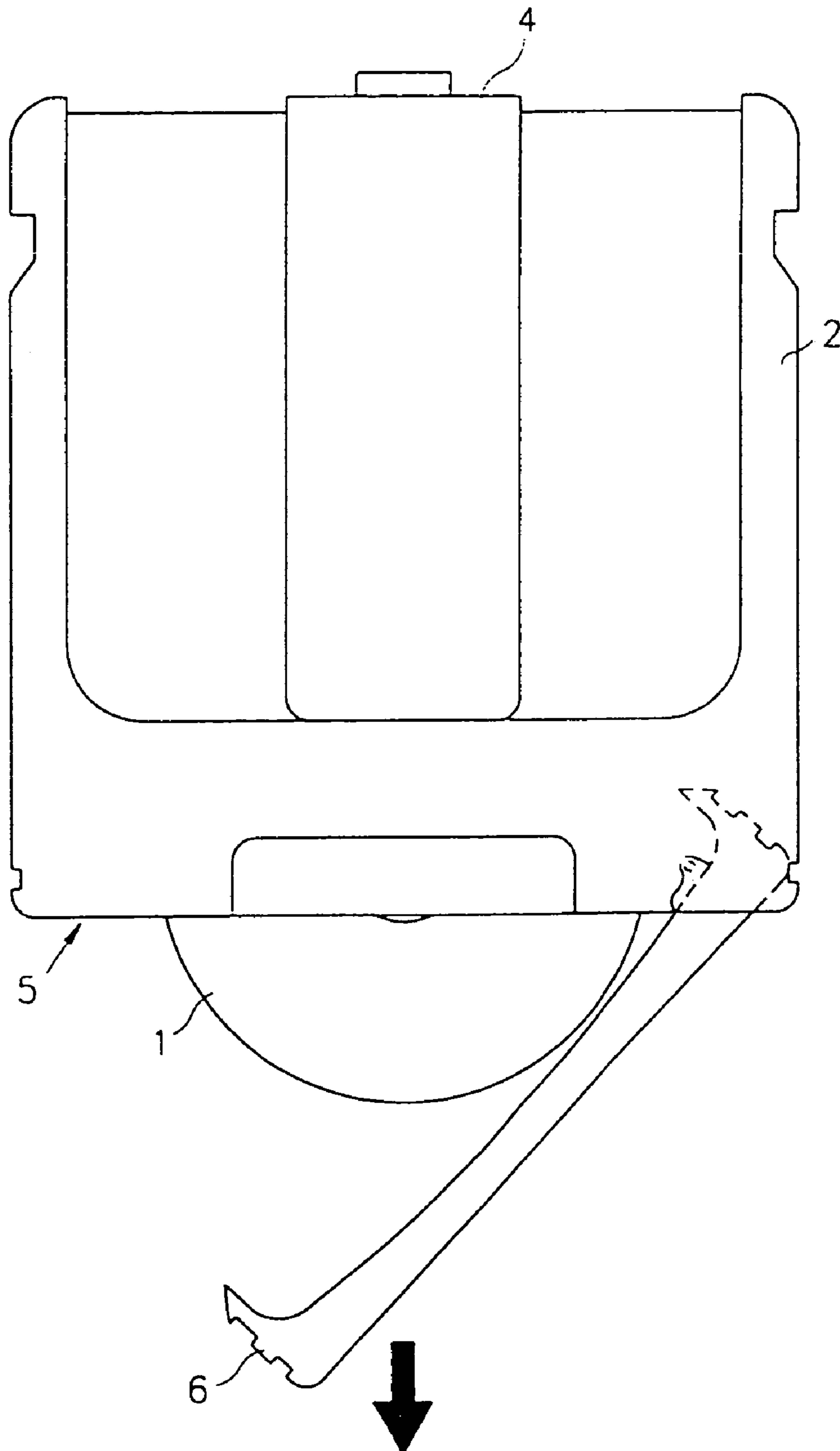


FIG. 2

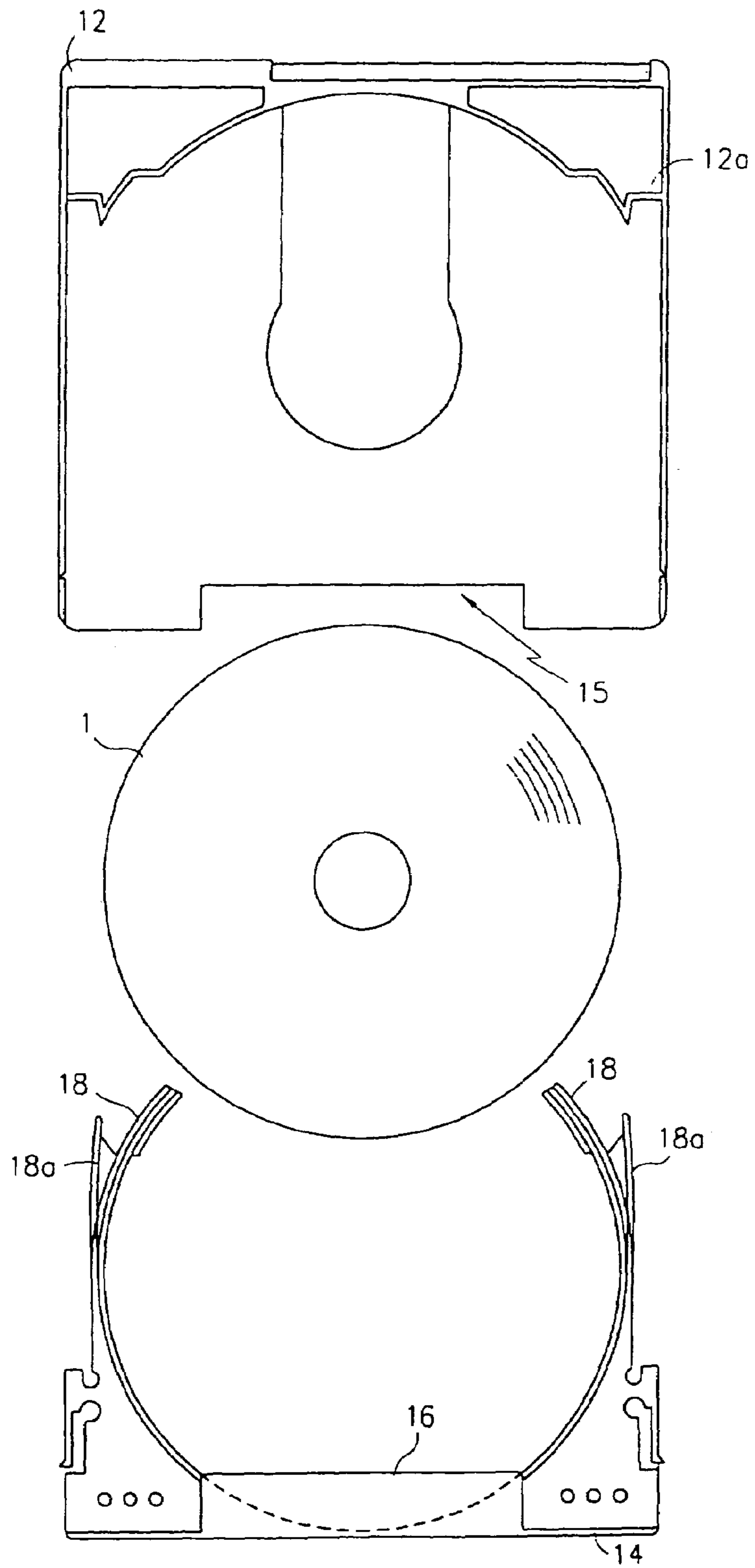


FIG. 5

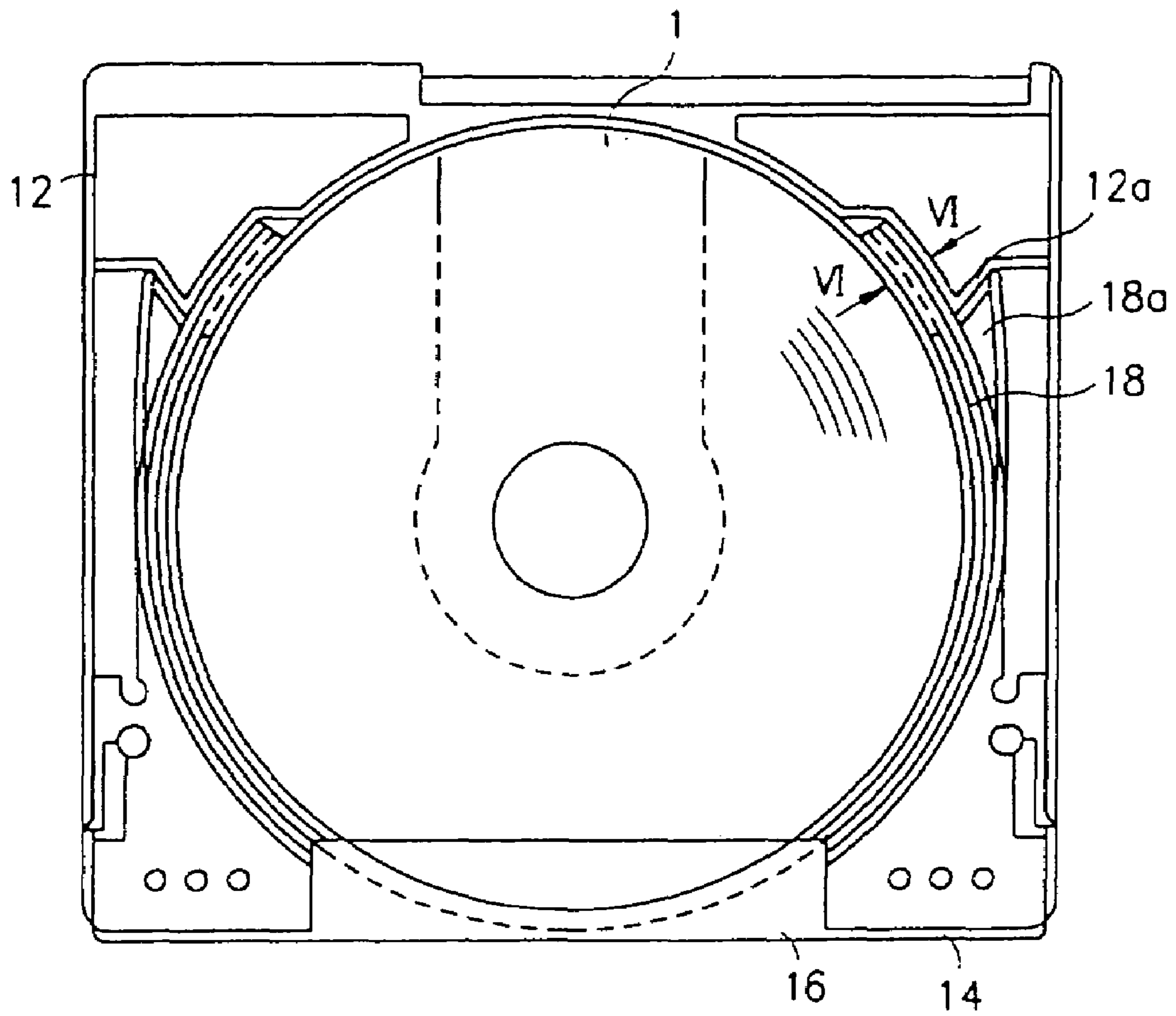


FIG. 6

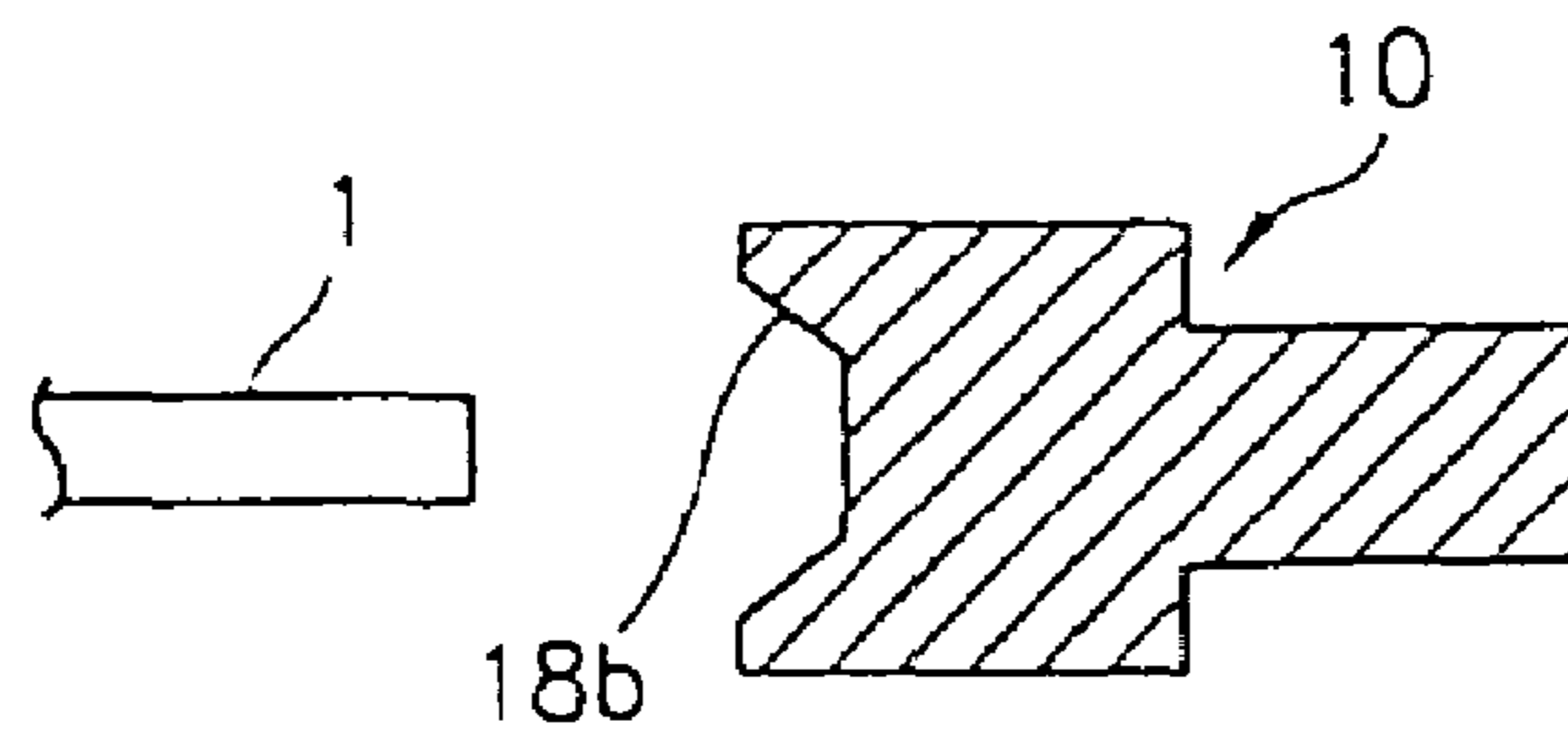


FIG. 7

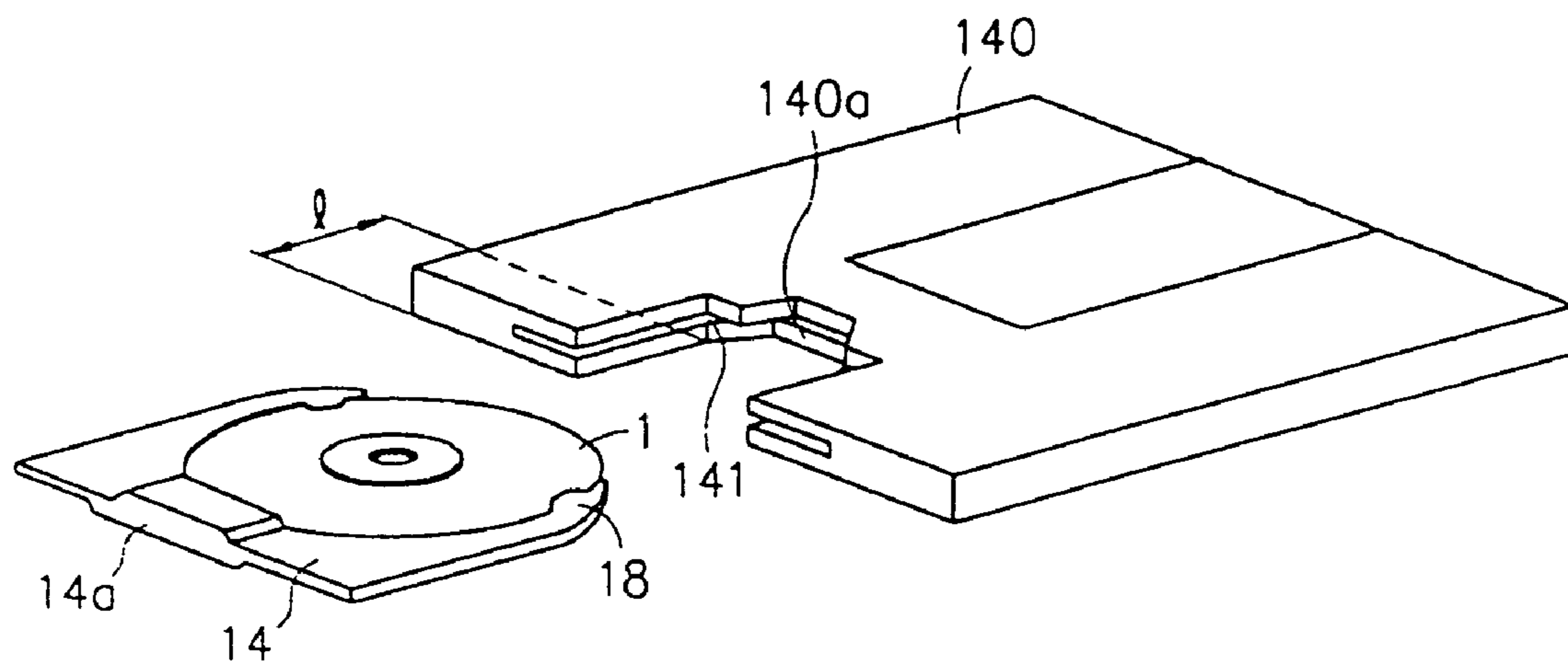


FIG. 8

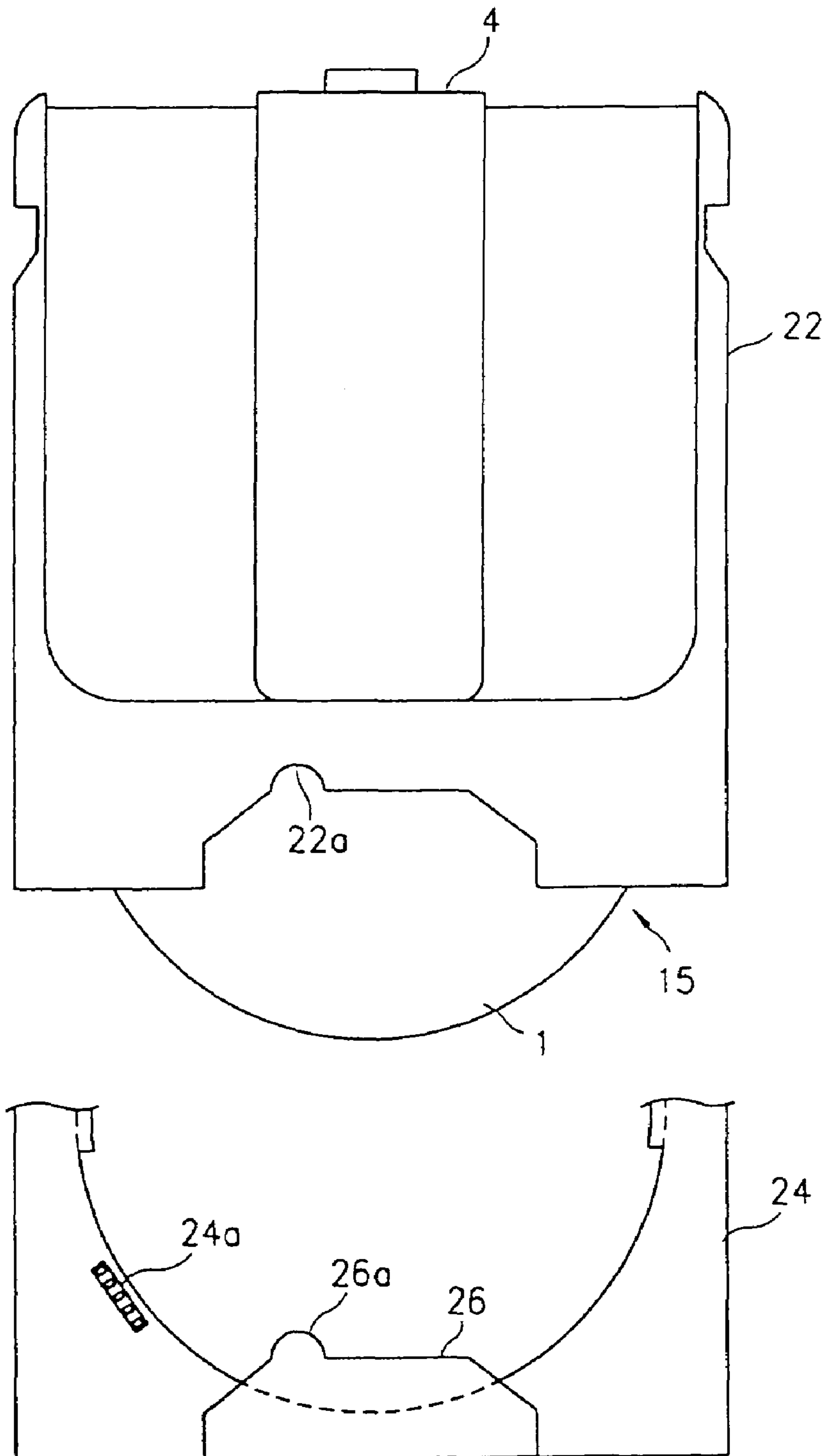


FIG. 9

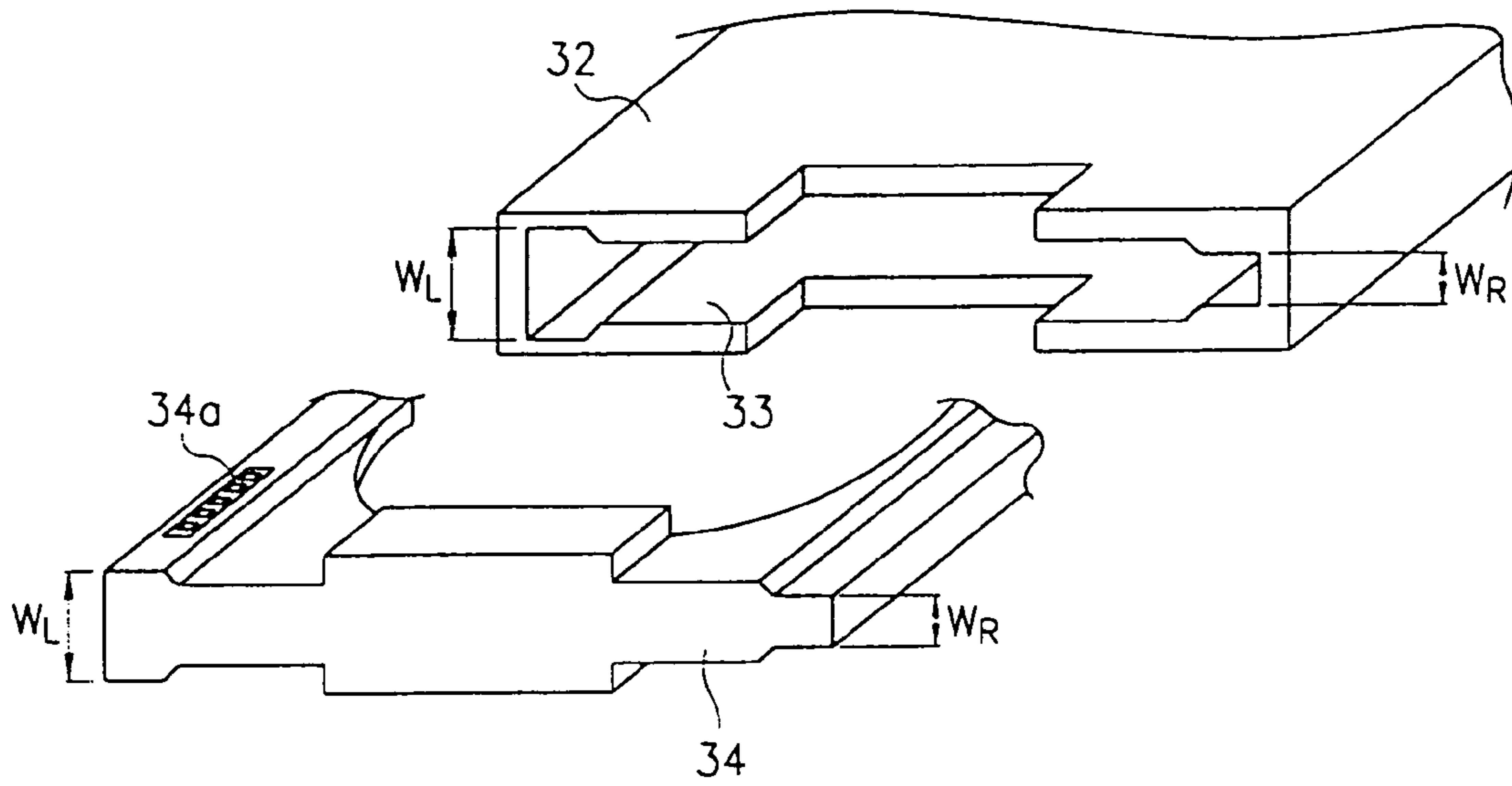


FIG. 10

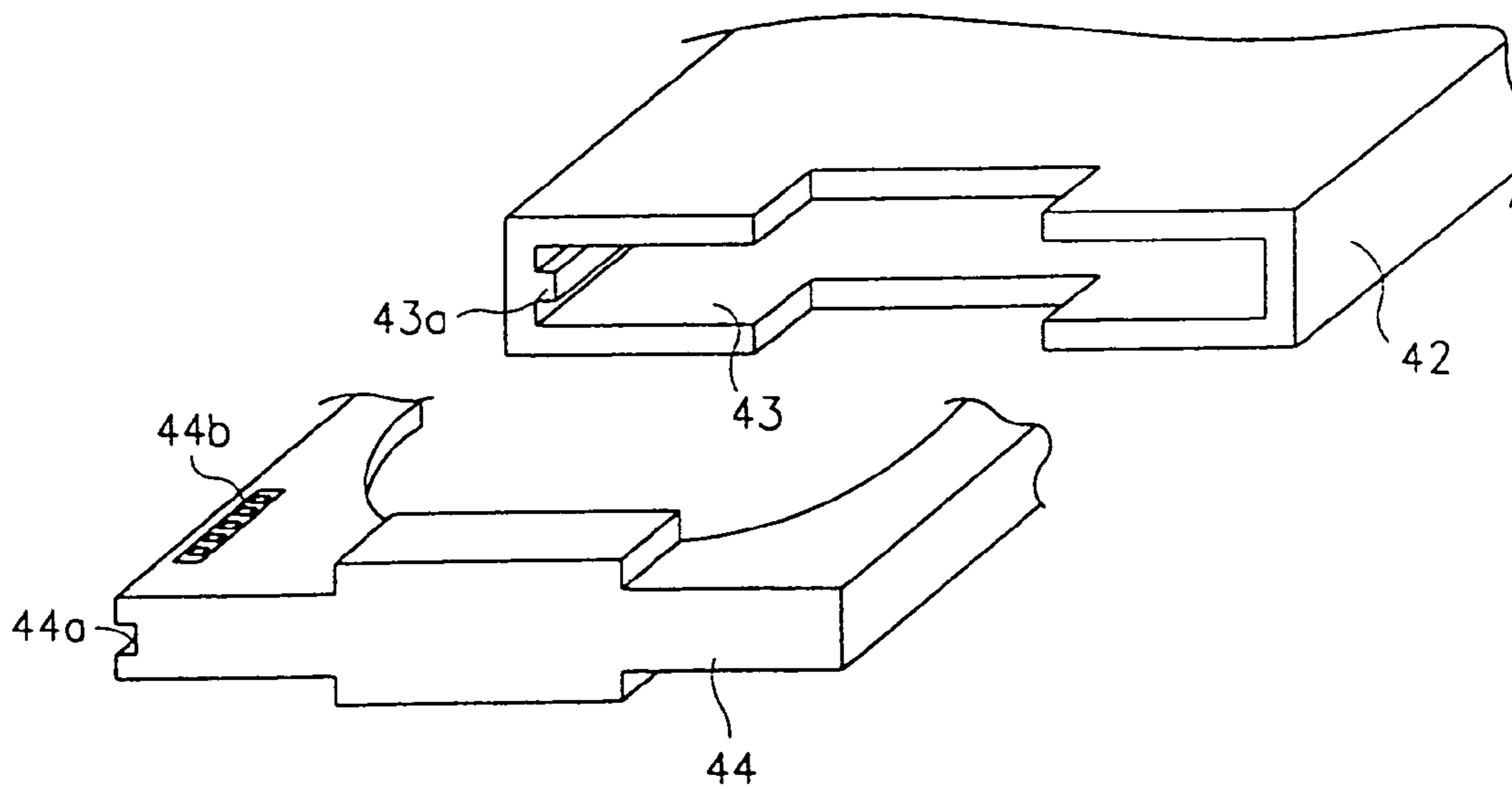
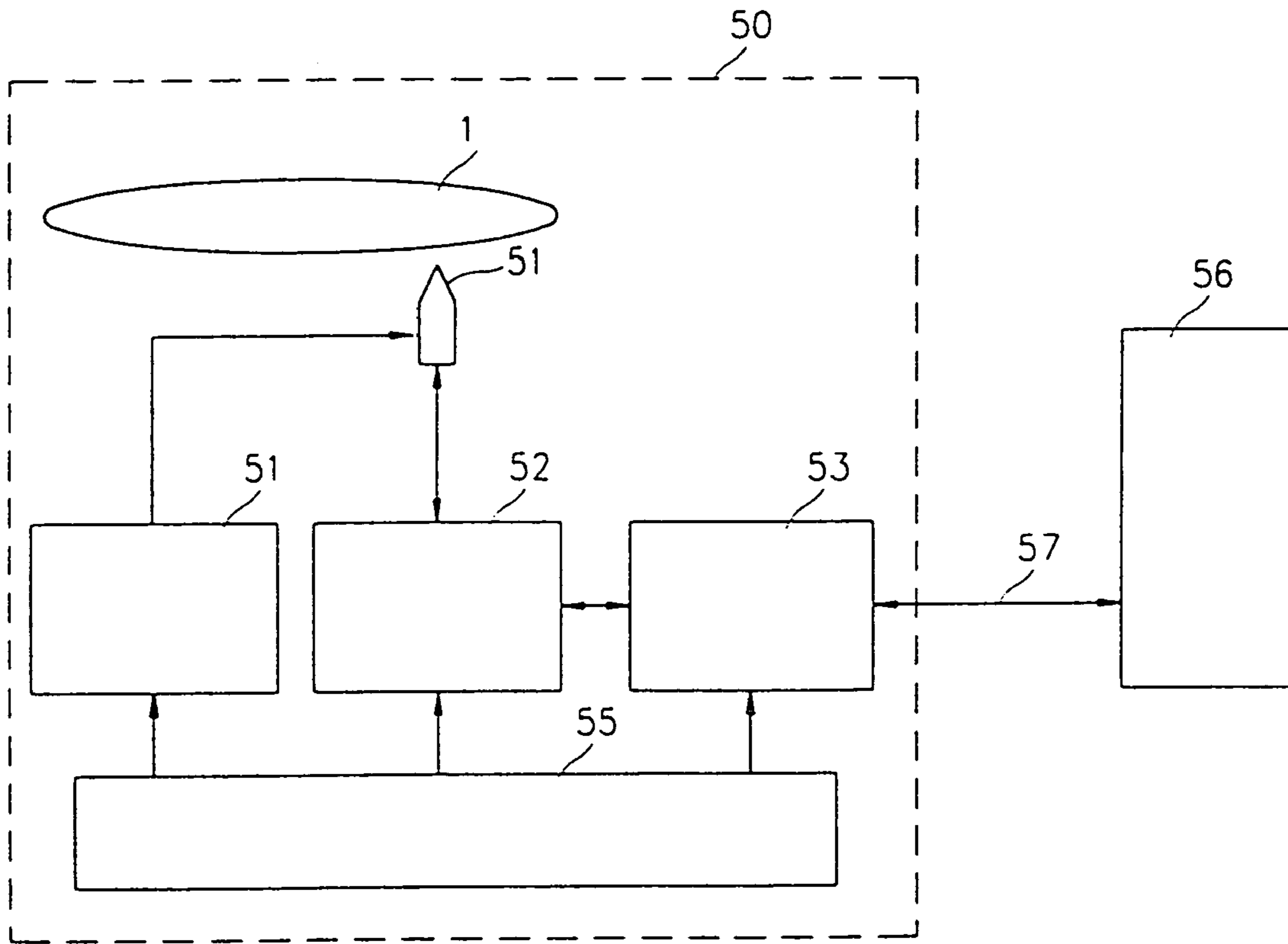


FIG. 11



DISK PRODUCTION CASING AND DRIVE FOR RECEIVING THE SAME

This application is a Divisional of application Ser. No. 10/337,999, filed on Jan. 8, 2003 now U.S. Pat. No. 6,757, 240 which is a Continuation of application Ser. No. 09/347, 388 filed on Jul. 6, 1999 now U.S. Pat. No. 6,529,471, and for which priority is claimed under 35 U.S.C. § 120; and this application claims priority of Application Nos. 28766/1998 filed in KOREA on Jul. 15, 1998 and 28824/1998 filed in KOREA on Jul. 16, 1998 under 35 U.S.C. § 119; the entire contents of all are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a disc protection casing and a drive for receiving the same.

2. Description of the Background Art

Types of a disc are classified into a reproducing-only type such as a CD-ROM, a DVD-ROM, etc., and a recordable type such as a WORM (Write Once Read Many) type, a rewritable type, etc. in accordance with the number of the data writing operations.

The writable-type disc is generally placed in a disc protection casing such as a cartridge, to protect the disc from external contamination or damage. It is required that the disc casing is designed to be opened when changing the disc.

Namely, when using a small size cartridge in a large size driving apparatus, since the small size cartridge does not have a certain size opening for the large size driving apparatus, the small size cartridge having a disc therein may not be used for the large size driving apparatus. Recently, a new cartridge capable of changing the disc inserted in the casing has been introduced in order to overcome the above-described problems.

As shown in FIG. 1, the cartridge includes a cartridge body **2** for receiving a disc **1** therein, and a disc holder **6** which may be detachably inserted via one edge of the cartridge body **2**.

An opening (not shown) is formed in the bottom of the cartridge body **2**, so that a pick-up unit of a drive can access the disc **1**, and the opening is closed and opened by a shutter **4**.

A receiving portion **5** is formed in the one edge of the cartridge body **2**, so that the disc **1** may be inserted into the interior of the cartridge body **2**.

In the thusly constituted conventional disc cartridge, when a user wishes to insert a bare state disc (the disc is separated from the cartridge body **2**) into the cartridge body **2**, the user holds a certain portion of a non-recorded surface of the disc **1** to prevent the data recorded surface from being contaminated and inserts the disc **1** into the receiving portion **5** of the cartridge body **2** and the inserts the disc holder **6** into the receiving port **5**.

On the contrary, in a state that a disc **1** is already inserted in the interior of the cartridge body **2**, in order to use a bare state disc **1**, for removing the disc **1** from the cartridge body **2**, the disc holder **6** is detached from the cartridge body **2**, and the disc **1** falls down by gravity due to the weight of the disc through the receiving port **5** when the cartridge is held upright by the user.

However, in the conventional disc cartridge, in order to insert the disc into the interior of the cartridge body or remove the disc from the cartridge body, the user holds the disc and inserts the disc into the cartridge body or holds the disc falling from the cartridge body by the weight of the disc.

In this case, the data recorded surface of the disc may be contaminated by pollutants or the like. Therefore, the disc must be very carefully handled.

As a very high capacity and high speed disc is introduced, if the disc is contaminated by pollutants and the like, it is impossible to reproduce the data recorded on the CD or a data reproducing error may occur.

In addition, discs are further classified into a disc having one recordable surface (hereinafter called a single sided disc) and a disc having two recordable surfaces (hereinafter called a double sided disc).

The single sided disc includes a recordable surface for recording and reproducing data and a label surface for attaching a label thereon, and the double sided disc includes only two recordable surfaces.

In the case of the single sided disc, the data recording surface is opposite to the optical pick-up unit and in the case of the double sided disc, one or both recordable surfaces of the double side disc may be opposite to the optical pick-up unit for thereby recording and reproducing the data. In the above-described structure, the disc holder **6** is inserted into the cartridge body **2** in a certain direction.

In the case of the single sided disc, the disc must be inserted in one direction, and in the case of the double sided disc, the surface to be recorded or reproduced must be inserted in a certain orientation.

However, when a user re-inserts a bare state single sided disc into the disc cartridge, since the conventional disc holder and the cartridge body are symmetrical, the user may erroneously insert the disc holder into the cartridge body, so that the insertion direction of the disc may be changed.

In particular, in the case of the single sided disc, even when the cartridge body and the disc holder are normally inserted, if the label surface of the disc is opposite to the optical pick-up unit can not access the disc.

Namely, when the disc is properly inserted into the cartridge body, and the disc holder is properly inserted thereinto, the disc is normally recorded and reproduced. Therefore, the user must carefully insert the disc into the disc cartridge, so that in the conventional art, there is much inconvenience to use the disc.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a disc protection casing and a drive for receiving the same which are capable of preventing a data recording surface of a disc from being contaminated when inserting and removing a disc.

It is another object of the present invention to provide a disc protection casing and a drive for receiving the same which are capable of easily separating a disc from the disc protection casing.

To achieve the above objects, there is provided a disc protection casing according to the present invention which includes a disc protection casing body having a disc receiving space therein, and a disc holder insertable into the interior of the disc protection casing body and having an elastic member formed at one end of the same for supporting the disc.

To achieve the above objects, there is also provided a disc holder according to the present invention which includes an elastic member engaged with a certain portion thereof for elastically supporting a disc, and a shoulder formed at one side of the elastic member for rotatably positioning and separating the disc in/from a receiving space of a drive.

In a disc protection casing and a drive for receiving the same according to the present invention, a disc protection casing for a single sided disc and a disc holder are inserted in a certain direction, and a double sided disc is inserted into a disc protection casing in a certain direction, so that it is possible to prevent an erroneous insertion of the disc.

To achieve the above objects, there is further provided a drive according to the present invention which includes a receiving portion including a disc protection casing having a disc receiving space therein, and disc holder receiving receivable in the disc protection casing body and having one end engaged with an elastic member for supporting a disc, and a recording and reproducing unit for recording and reproducing data on/from a disc received in the interior of the disc protection casing.

Additional advantages, objects and features of the invention will become more apparent from the description which follows.

BREIF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully understood from the detailed description given hereinabove and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention, and wherein:

FIG. 1 is a view illustrating a conventional detachable disc cartridge;

FIG. 2 is an exploded plan view illustrating the structure of the a cartridge body and a disc holder according to a first embodiment of the present invention;

FIG. 3 is a plan view illustrating a state that a disc is inserted in a disc holder as shown in FIG. 2;

FIG. 4 is a plan view illustrating a state before a disc holder of FIG. 2 is inserted into a cartridge body;

FIG. 5 is a plan view illustrating a state after a disc holder of FIG. 2 is inserted into a cartridge body;

FIG. 6 is a cross-sectional view taken along line VI—VI of FIG. 5;

FIG. 7 is a perspective view illustrating an insertion relationship between an adapter and a disc holder according to a first embodiment of the present invention;

FIG. 8 is a plan view illustrating the structures of a disc cartridge according to a second embodiment of the present invention and a holder insertable into the disc cartridge;

FIG. 9 is a partial perspective view illustrating a disc cartridge according to a third embodiment of the present invention and a holder insertable in the disc cartridge;

FIG. 10 is a partial perspective view illustrating a disc cartridge according to a fourth embodiment of the present invention and a holder insertable in the disc cartridge; and

FIG. 11 is a schematic block diagram illustrating an optical disc recording and reproducing unit according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The disc protection casing and a drive for receiving the same according to the present invention will be explained with reference to the accompanying drawings.

As shown in FIG. 2, a disc cartridge according to the present invention includes a cartridge body 12 having a disc receiving space formed therein and slanted surfaces 12a which operate as guide members formed at an outer portion of the receiving space, and a disc holder 14 having semi-

circular tension arms 18 which operate as elastic members for elastically supporting the disc 1.

A receiving port 15 is formed in an outer edge of the cartridge body 12, and a disc 1 inserted therethrough into the disc holder 14 is received into the interior of the cartridge body 12 via the receiving port 15.

The slanted surfaces 12a are integrally formed with the cartridge body 12 in a rib shape when injection-molding the cartridge body 12. These slanted surfaces 12a contact with the tension arms 18 when the disc holder 14 holding the disc 1 is received into the cartridge body 12, so that the tension arms 18 are pushed toward the respective lateral walls of the cartridge body 12 for thereby releasing a restricting force of the tension arms 18 with respect to the disc 1.

In addition, when the disc holder 14 is separated from the cartridge body 12, the tension arms 18 provide a certain elastic force to the disc 1 in a radial direction of the disc 1, so that the disc 1 is not separated from the disc holder 14.

In order to release the restriction force on the disc 1 and support the disc 1, shoulders 18a which are engaged to the slanted surfaces 12a are integrally formed at respective outer portions of the tension arms 18 being integral with the disc holder 14 when injection-molding the disc holder 14, and holder portion 16 is formed at an outer edge portion of the disc holder 14 for holding the disc holder 14.

As shown in FIG. 3, the tension arms 18 elastically support the disc 1 using a certain radial force applied toward the center portion of the disc 1, so that the disc 1 is stably supported by the holding portion 16 and the tension arms 18.

The process by which the disc 1 is inserted into the cartridge body 12 will now be explained in detail.

As shown in FIG. 2, a disc 1 is first inserted by a user into the disc holder 14 through an opening formed between the outer end portions of the tension arms 18 in the direction of arrow. As the disc 1 is inserted, the tension arms 18, are spread outwardly and upon completion of the inserting operation, the tension arms 18 elastically hold the disc 1 against the holding portion 16.

At this state as shown in FIG. 3, the user holds the holding portion 16 of the disc holder 14 into the cartridge body 12 via the receiving port 15.

Upon inserting the disc holder 14 into the cartridge body 12, the shoulders 18a formed at the tension arms 18 contact with the slanted surfaces 12a of the cartridge body 12 before the disc holder 14 is inserted fully.

Namely, the shoulders 18a are moved toward the respective walls of the cartridge body 12 along the slanted surfaces 12a from the state of FIG. 4 to the state of FIG. 5, so that an elastic supporting force of the tension arms 18 with respect to the disc 1 is released.

The disc 1 is rotatably positioned in the cartridge body 12, so that a spindle motor (not shown) can rotate the disc 1, and the optical pick-up unit (not shown) can access the recording surface of the disc 1.

The converse operation by which the disc holder 14 is separated from the cartridge body 12 in order to remove the disc 1 from the cartridge body 12 will next be explained.

When separating the disc holder 14 from the cartridge 12, the restriction force exerted by the slanted surfaces 12a to the shoulders 18a is released, so that the tension arms 18 support the disc 1 by an elastic recovering force of the tension arms 18.

At this time, since a concave slanted surface 18b is formed in end portion of each tension arm 18, even when the disc 1 is moved up and down in the cartridge body 12, the

5

disc **1** is stably guided to the center portion of the tension arms **18a**, so that the tension arms **18** stably support the disc **1**.

In the present invention, since the tension arms **18** which elastically support the disc **1** need have only a certain thickness compared to the height of the edge of the disc **1**, the thickness of the disc holder **14** can be made small.

As shown in FIG. 7, in order to record and reproduce a small size recording medium (for example, when the diameter of the disc is 80 mm) using a disc driving apparatus which is capable of recording or reproducing a large size recording medium (for example, when the diameter of the disc is 120 mm), a slanted surface (not shown) which has the above-described function may be formed in the interior of an adapter **140** having an outer size which is the same as the cartridge body of the large size recording medium for the reason that a certain compatibility with respect to other apparatuses is obtained because almost all driving apparatuses are recently designed to drive a large size recording medium.

In this case, the user can detachably mount the disc holder **14** with the disc **1** therein at the receiving port **141** of the adapter **140**.

In the drawings, reference numeral "I" designated a length difference between the large size recording medium and the small size recording medium. The end portion **14a** of the disc holder **14** is moved up to the center end portion **140a** of the adapter **140** when inserting the disc holder **14** in the adapter **140** for thereby obtaining a certain size opening.

The disc cartridge according to a second embodiment of the present invention includes a certain structure so that the cartridge body and the disc holder can be inserted only in a certain orientation.

As shown in FIG. 8, a groove **22a** which is formed eccentrically in a leftward or rightward direction is formed in the cartridge body **22**, and a protrusion **26a** is formed on the disc holder **24** to be matingly insertable into the groove **22a**.

The protrusion **26a** is formed on the holding portion **26** and is eccentrically formed leftwardly or rightwardly to be opposite to the groove **22a**.

Therefore, since the groove **22a** and the protrusion engageable only in a certain opposed orientation, the disc holder **24** is received in the cartridge body **22** only in a certain orientation.

Namely, the disc holder **24** is not received in the cartridge body **22** in a state that the groove **22a** does not correspond to the protrusion **26a**.

A guide message **24a** is written on the upper surface of the disc holder **24** for guiding an insertion direction when the disc **1** is inserted into the cartridge body **22**.

As the guide message, there are "Recordable side of disc" or "Label side of disc" in accordance with the data recording surface or label surface of the disc **1**, so that a user can recognize the insertion direction of the disc **1**.

Therefore, the user can insert the disc holder into the cartridge body **22** in a certain orientation based on an asymmetrical shape of the cartridge body **22** and the disc holder **24**, and the insertion direction of the disc **1** is coincided with the insertion direction of the cartridge body **22** and the disc holder **24** based on the guide message **24a**.

As shown in FIG. 9, the disc cartridge according to a third embodiment of the present invention includes a cartridge body **32** having an asymmetrically shaped receiving port **33**, and a disc holder **34** having an asymmetrically shaped end portion corresponding to the receiving port **33**.

6

In the embodiment of FIG. 9, the width $W_{sub.L}$ between the receiving port **33** and the left edge portion of the disc holder **34** received in the receiving port **33** is wider than the width $W_{sub.R}$ of the right edge portion.

Namely, if the shape of the disc holder **34** received in the cartridge body **32** is not coincided with the shape of the receiving port **33** of the cartridge body **32**, the disc holder **34** is not received thereinto, so that a certain insertion orientation is implemented.

A guide message **34a** is formed on the upper surface of the disc holder **34** as shown in FIG. 9 to inform the user of the insertion orientation of the disc **1** in the same manner as in the embodiment of FIG. 8.

FIG. 10 is a perspective view illustrating a disc cartridge according to a fourth embodiment of the present invention.

As shown therein, the disc cartridge according to the fourth embodiment of the present invention includes a cartridge body **42** in which a rail **43a** is protruded from a lateral wall of a receiving port **43**, and a disc holder **44** having a groove **44a** which is opposite to the rail **43a**.

In the embodiment of FIG. 10, the rail **43a** is formed only at a left lateral wall of the receiving port **43** and has a certain height, and a rail is not formed at the right lateral wall.

Namely, when the disc holder **44** is inserted into the cartridge body **42**, if the groove **44a** in the disc holder **44** and the rail **43a** of the cartridge **42** are not corresponding engaged with each other, the disc holder **44** is not received into the cartridge body **42**. Therefore, the disc holder **44** is received only in a certain orientation.

A guide message **44b** is formed on the upper surface of the disc holder **44** of the fourth embodiment of the present invention to inform the user of the insertion orientation of the disc **1** in the same manner as in the embodiments of FIGS. 8 and 9.

In the adapter **140** of FIG. 7 which is used for recording and reproducing a double sided or single sided recording medium using a disc driving apparatus capable of recording or reproducing a large sized recording medium, the receiving port **141** of the adapter **140** and the disc holder **14** received in the receiving port **141** are asymmetrically formed, so that the disc holder **14** is received into the adapter **140** only in a certain orientation.

In this case, a guide message may be printed on a certain portion of the adapter **140** to inform the user of the insertion orientation of a small sized recording medium.

As shown in FIG. 11, the disc recording and reproducing unit **50** which drives the disc **1** includes an optical pick-up unit **51** recording and reproducing data on/from the disc **1**, an optical pick-up unit transport unit **51** the optical pick-up unit **51**, a data processing unit **52** processing the data inputted and transferring the processed data to the optical pick-up **51**, an interface unit **53**, and a controller **55** controlling the operations of the above-described elements. The interface unit **53** of the optical disc recording apparatus is connected with a host **56**, so that certain instructions and data **57** are communicated therebetween.

As described above, the disc protection casing and a drive for receiving the same according to the present invention are capable of preventing a data recording surface of a disc from being contaminated when inserting and removing the disc.

In the present invention, since the disc is inserted in the disc holder, a user is able to easily insert a disc into a cartridge and remove the disc from the cartridge.

In the single sides disc cartridge according to the present invention, since the cartridge body and the disc holder are

7

asymmetrically formed, a certain insertion orientation is implemented for thereby preventing an erroneous operation of the apparatus.

In the present invention, since there is provided a guide message for informing a user of the insertion orientation of the disc, it is possible to prevent an erroneous insertion of the disc holder into the cartridge body.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible. Without departing from the scope and spirit of the invention as recited in the accompanying claims.

What is claimed:

1. A disc cartridge comprising:

a cartridge body having a receiving space therein, a receiving port formed at an outer edge thereof, and a rib acting as a guide member formed at an outer periphery of the receiving space, the receiving port including a part of a concave shape; and

a disc holder insertable into the cartridge body, the disc holder having a pair of semi-circular tension arms for grasping a disc therebetween, each tension arm having a shoulder being integrally formed at an outer lateral portion of the tension arm and extended outwardly therefrom for contacting and engaging the rib in the cartridge body as the disc holder is inserted into the cartridge body, wherein the disc holder has a holding portion that engages with the receiving port, the holding portion includes a part of a convex shape, and the part of the convex shape engages with the part of the concave shape, when the holding portion engages with the receiving port,

whereby, as the disc holder is inserted into the cartridge body, the shoulders are guided along the rib outwardly toward respective lateral walls of the cartridge body so that the tension arm integrally formed with the shoulders are pushed outwardly toward the respective lateral walls of the cartridge body for thereby releasing the disc grasped therebetween,

wherein outside edges of the part of the convex shape of the holder portion and the part of the concave shape of the receiving port extend beyond outside edges of a drive spindle window included in the disc cartridge.

2. The cartridge of claim 1, wherein the rib is inclined to act as linear cam for guiding the shoulders formed integrally at the outer lateral portions of the tension arms when the disc holder is inserted into the cartridge body.

3. The cartridge of claim 1, wherein the shoulders extend from the tension arms at outer lateral portions thereof intermediate outer grasping ends of the tension arms and the holding portion.

4. The cartridge of claim 3, wherein each tension arm has a semi-circular inner portion, the outer lateral portion has length defined by a distance from the holding portion to an end portion thereof, the inner portion has a length defined by a distance from the holding portion to an end portion thereof, and the length of the outer lateral portion being less than the length of the inner portion.

5. The cartridge of claim 3, wherein each tension arm has a semi-circular inner portion, and the outer lateral portion extends from the holding portion less than the inner portion.

6. The cartridge of claim 1, wherein the tension arm has a semi-circular inner portion and has a groove formed thereon for receiving a periphery of the disc.

8

7. The cartridge of claim 1, wherein the disc holder further includes:

a locking means formed adjacent to the holding portion for cooperating with an inner surface of the cartridge body to allow the disc holder to operatively engage and disengage with the cartridge body.

8. The cartridge of claim 1, wherein the concave and convex shapes comprise rectangular shapes.

9. The cartridge of claim 1, wherein the tension arms extend from the outside edges of the part of the convex shape of the holding portion.

10. The cartridge of claim 1, wherein the tension arms include inner and outer branches separable from each other, and wherein the outer branches engage with the rib and extend outwardly therefrom and the inner branches do not engage with the rib and grasp or release edges of a disc placed in the disc holder.

11. A disc drive comprising:

a receiving portion for receiving a cartridge body and a disc holder insertable into the cartridge body,

the cartridge body having a receiving space therein, a receiving port formed at an outer edge thereof, and a rib acting as a guide member formed at an outer periphery of the receiving space, the receiving port including a part of a concave shape; and

the disc holder having a pair of semi-circular tension arms for grasping a disc therebetween, each tension arm having a shoulder being integrally formed at an outer lateral portion of the tension arm and extended outwardly therefrom for contacting and engaging the rib in the cartridge body as the disc holder is inserted into the cartridge body, wherein the disc holder has a holding portion that engages with the receiving port, the holding portion includes a part of a convex shape, and the part of a convex shape engages with the part of a concave shape, when the holding portion engages with the receiving port; and

a recording and reproducing unit operatively connected with the receiving port for recording data onto and reproducing data from the disc released by the disc holder,

whereby, as the disc holder is inserted into the cartridge body, the shoulders are guided along the rib outwardly toward respective lateral walls of the cartridge body so that the tension arms integrally formed with the shoulders are pushed outwardly toward the respective lateral walls of the cartridge body for thereby releasing the disc grasped therebetween,

wherein outside edges of the part of the convex shape of the holder portion and the part of the concave shape of the receiving port extend beyond outside edges of a drive spindle window included in the disc drive.

12. The disc drive of claim 11, wherein the rib is inclined to act as a linear cam for guiding the shoulders formed integrally at the outer lateral portions of the tension arms when the disc holder is inserted into the cartridge body.

13. The disc drive of claim 11, wherein the shoulders extend from the tension arms at outer lateral portions thereof intermediate outer grasping ends of the tension arms and the holding portion, and wherein each tension arm has a semi-circular inner portion, and the outer lateral portion extends from the holding portion less than the semi-circular inner portion.

14. The disc drive of claim 11, wherein the rib has wedge-shaped portions that respectively contact and engage with the shoulders of each tension arm.

9

15. The disc drive of claim 11, wherein the recording and reproducing unit includes:

an optical pickup unit to record and reproduce data to and from the disc,

a transporting unit to transport the optical pickup unit,

a data processing unit to process the data inputted and transfer the processed data to the optical pickup unit, and

a controller to control the operations for recording and reproducing data.

16. The disc drive of claim 15, wherein the recording and reproducing unit further includes:

an interface unit, connected with a host, to communicate with therebetween.

10

17. The disc drive of claim 15, wherein the concave and convex shapes comprise rectangular shapes.

18. The disc drive of claim 11, wherein the tension arms extend from the outside edges of the part of the convex shape of the holding portion.

19. The disc drive of claim 11, wherein the tension arms include inner and outer branches separable from each other, and wherein the outer branches engage with the rib and extend outwardly therefrom and the inner branches do not engage with the rib and grasp or release edges of a disc placed in the disc holder.

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